



03-05-04

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Notice of Allowance: August 26, 2003

PATENT

Docket No. MTI-31608

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Hock Chuan Tan, et al.

Serial No. : 10/068,159

Filing Date : February 5, 2002

For : Stacked Die in Die BGA Package

Group Art Unit : 2818

Confirmation No. : 8043

Examiner : Thao P. Le

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OFFICE OF PETITIONS

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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Date: March 4, 2004

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Commissioner for Patents
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COMMUNICATION

Sir:

Applicant has not received official notification of the receipt of the **Claim for Priority** **Under 35 USC §119 and Transmittal of Certified Copy**, which was submitted to the USPTO by Express Mail on May 14, 2002.

Enclosed herewith is a copy of the documents that were earlier submitted to the Examiner, including a copy of the PTO-stamped return postcard indicating receipt on May 14, 2002.

The Examiner is requested to acknowledge receipt of the above documents and the claim to priority.

Respectfully submitted,

Dated: March 4, 2004

Kristine M. Strothoff
Reg. No. 34,259

WHYTE HIRSCHBOECK DUDEK S.C.
555 East Wells Street, Suite 1900
Milwaukee, Wisconsin 53202-3819
(414) 273-2100
Customer No. 31870



COPY

PATENT

Attorney Docket No. MTI-31608

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Tan, Hock Chuan et al.
Serial No. : 10/068,159
Filing Date : February 5, 2002
For : Stacked Die in Die BGA Package
Group Art Unit : 2812
Confirmation No. : 8043

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CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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37 CFR 1.8(a) **37 CFR 1.10**
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Transmission
 transmitted by facsimile to Fax No _____ addressed to Examiner _____ at the US Patent and Trademark Office.

Date: May 14, 2002

Assistant Commissioner for Patents
Washington, D.C. 20231

**CLAIM FOR PRIORITY UNDER 35 U.S.C. § 119
AND TRANSMITTAL OF CERTIFIED COPY**

Sir:

Applicant hereby request the right of priority under 35 U.S.C. § 119 for the above-identified patent application.

The information for the priority foreign application is as follows:

Country: Singapore (Registry of Patents)

Prior Foreign Application No. 200200134-5

Foreign Filing Date: January 9, 2002 (01/09/02)

The basis for the claim for priority is the Paris Convention for the Protection of Industrial Property. Singapore is a member in the World Trade Organization (WTO).

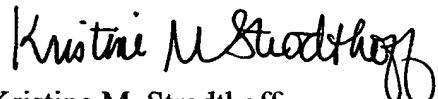
The claim for priority is hereby presented during the pendency of the above-identified application, and within the later of four months from the actual filing date of the application or sixteen months from the filing date of the prior foreign application, as required under 37 CFR § 1.55(a)(1)(i).

A certified copy of the foreign application is enclosed herewith, as required under 37 CFR § 1.55(a)(2).

As provided under MPEP 201.13(A) and 201.14(b), the priority claim statement is signed the Attorney for Applicant authorized to sign correspondence under 37 CFR § 1.33(b).

The Examiner is urged to telephone the undersigned Attorney for Applicant if any questions should arise.

Respectfully submitted,



Kristine M. Strodtboff
Registration No. 34,259

Dated: May 14, 2002

P.O. ADDRESS:

WHYTE HIRSCHBOECK DUDEK S.C.
111 East Wisconsin Avenue, Suite 2100
Milwaukee, Wisconsin 53202
(414) 273-2100

Customer No. 31870



REGISTRY OF PATENTS SINGAPORE

This is to certify that the annexed is a true copy of the following Singapore patent application as filed in this Registry.

Date of Filing : 9 JANUARY 2002

Application Number : 200200134-5

Applicant(s) : MICRON TECHNOLOGY, INC.

Title of Invention : STACKED DIE IN DIE BGA PACKAGE

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MAR 10 2004

Sharmaine
Sharmaine Wu Shee Mei
Assistant Registrar
for REGISTRAR OF PATENTS
SINGAPORE

REQUEST FOR THE GRANT OF A PATENT
THE GRANT OF A PATENT IS REQUESTED BY THE UNDERSIGNED ON THE PRESENT
APPLICATION

<i>I. Title of Invention</i>	STACKED DIE IN DIE BGA PACKAGE	
<i>II. Applicant(s) (see note 2)</i>	<i>(a) Name</i>	MICRON TECHNOLOGY, INC.
	<i>Body Description/ Residency</i>	INCORPORATED IN STATE OF DELAWARE, USA
	<i>Street Name & Number</i>	8000 SOUTH FEDERAL WAY BOISE, IDAHO 83707
	<i>City</i>	
	<i>State</i>	
	<i>Country</i>	United States of America
	<i>(b) Name</i>	
	<i>Body Description/ Residency</i>	
	<i>Street Name & Number</i>	
	<i>City</i>	
	<i>State</i>	
	<i>Country</i>	
	<i>(c) Name</i>	
	<i>Body Description/ Residency</i>	
	<i>Street Name & Number</i>	
	<i>City</i>	
	<i>State</i>	
	<i>Country</i>	

09 JAN 2002
200200134-5

<i>III. Declaration of Priority (see note 3)</i>	<i>Country/Country Designated</i>		<i>File no.</i>	
	<i>Filing Date</i>			
	<i>Country/Country Designated</i>		<i>File no.</i>	
	<i>Filing Date</i>			
	<i>Country/Country Designated</i>		<i>File no.</i>	
	<i>Filing Date</i>			
<i>IV. Inventors (See note 4)</i>				
(a) <i>The applicant(s) is/are the sole/joint inventor(s).</i>	<input type="checkbox"/> <input checked="" type="checkbox"/>	<i>Yes</i>	<input type="checkbox"/> <input checked="" type="checkbox"/>	<i>No</i>
(b) <i>A statement on Patents Form 8 &/will be furnished.</i>		<i>Yes</i>		<i>No</i>
<i>V. Name of Agents (if any) (See note 5)</i>	DREW & NAPIER LLC			
<i>VI. Address for Service (See note 6)</i>	<i>Block/Hse No</i>		<i>Level No</i>	
	<i>Unit No/PO Box</i>	152	<i>Postal Code</i>	900302
	<i>Street Name</i>	ROBINSON ROAD		
	<i>Building Name</i>			
<i>VII. Claiming an earlier filing date under section 20(3), 26(6) or 47(4). (See note 7)</i>	<i>Application No</i>	---		
	<i>Filing Date</i>			
<i>[Please tick in the relevant space provided]:</i>				
<input type="checkbox"/> <i>Proceeding under rule 27(1)(a).</i>				
<i>Date on which the earlier application was amended =</i> _____ <i>or</i>				
<input type="checkbox"/> <i>Proceeding under rule 27(1)(b)</i>				

200200134-5

09 JAN 2002

VIII. Invention has been displayed at an International Exhibition (See note 8)		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No																							
IX. Section 114 requirements (see note 9)		The invention relates to and/or used a micro-organism deposited for the purposes of disclosure in accordance with section 114 with a depositary authority under the Budapest Treaty.																								
		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No																							
X. Check List (To be filled in by applicant or agent)		<p>A. The application contains the following number of sheet(s):-</p> <table border="1"> <tr> <td>1. Request</td> <td>4</td> <td>sheets</td> </tr> <tr> <td>2. Description</td> <td>17</td> <td>sheets</td> </tr> <tr> <td>3. Claim(s).</td> <td>20</td> <td>sheets</td> </tr> <tr> <td>4. Drawing(s).</td> <td>14</td> <td>sheets</td> </tr> <tr> <td>5. Abstract.</td> <td>4</td> <td>sheets</td> </tr> </table> <p>B. The application as filed is accompanied by:-</p> <table border="1"> <tr> <td>1. Priority document</td> <td></td> </tr> <tr> <td>2. Translation of priority document</td> <td></td> </tr> <tr> <td>3. Statement of Inventorship & right to grant</td> <td></td> </tr> <tr> <td>4. International Exhibition Certificate</td> <td></td> </tr> </table>		1. Request	4	sheets	2. Description	17	sheets	3. Claim(s).	20	sheets	4. Drawing(s).	14	sheets	5. Abstract.	4	sheets	1. Priority document		2. Translation of priority document		3. Statement of Inventorship & right to grant		4. International Exhibition Certificate	
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2. Translation of priority document																										
3. Statement of Inventorship & right to grant																										
4. International Exhibition Certificate																										
XI. Signature(s) (see note 10)		<table border="1"> <tr> <td>Applicant (a)</td> <td>DREW & NAPIER LLC</td> <td>10m</td> </tr> <tr> <td>Date</td> <td>8 JAN 2002</td> <td></td> </tr> <tr> <td>Applicant (b)</td> <td></td> <td></td> </tr> <tr> <td>Date</td> <td></td> <td></td> </tr> <tr> <td>Applicant (c)</td> <td></td> <td></td> </tr> <tr> <td>Date</td> <td></td> <td></td> </tr> </table>		Applicant (a)	DREW & NAPIER LLC	10m	Date	8 JAN 2002		Applicant (b)			Date			Applicant (c)			Date							
Applicant (a)	DREW & NAPIER LLC	10m																								
Date	8 JAN 2002																									
Applicant (b)																										
Date																										
Applicant (c)																										
Date																										

200200134-5

09 JAN 2002

NOTES:

1. This form when completed, should be brought or sent to the Registry of Patents together with the prescribed fee and 3 copies of the description of the invention, and of any drawings.
2. Enter the name and address of each applicant in the space provided at paragraph II. Names of individuals should be indicated in full and the surname or family name should be underlined. The names of all partners in a firm must be given in full. The place of residence of each individual should also be furnished in the space provided. Bodies corporation should be designated by their corporate name and country of incorporation and, where appropriate, the state of incorporation within that country should be entered where provided. Where more than three applicants are to be named, the name and address of the fourth and any further applicants should be given on a sheet attached to this Form together with the signature of each of these further applicants.
3. The declaration of priority at paragraph III should state the date of the previous filing, the country in which it was made, and indicated the file number, if available. Where the application relied upon in an International Application or a regional patent application e.g. European patent application, one of the countries designated in that application [being one falling under the Patents (Conventional Countries) Order] should be identified and the name of that country should be entered in the space provided.
4. Where the applicant or applicants is/are the sole inventor or the joint inventors, paragraph IV should be completed by making the 'YES' Box in the declaration (a) and the 'NO' Box in the alternative statement (b). Where this is not the case, the 'NO' Box in declaration (a) should be marked and a statement will be required to be filed on Patents Form 8.
5. If the applicant has appointed an agent to act on his behalf, the agent's name should be indicated in the spaces available at paragraph V.
6. An address for service in Singapore to which all documents may be sent must be stated at paragraph VI. It is recommended that a telephone number be provided if an agent is not appointed.
7. Where an application is made by virtue of section 20(3), 26(6) or 47(4), the appropriate section should be identified at paragraph VII and the number of the earlier application or any patent granted thereon identified.
8. When the applicant wishes an earlier disclosure of the invention by him at an International Exhibition to be disregarded in accordance with section 14(4)(c), then the 'YES' box at paragraph VIII should be marked. Otherwise the 'NO' box should be marked.
9. Where in disclosing the invention the application refers to one or more micro-organisms deposited with a depository authority under the Budapest Treaty, then the "YES" box at paragraph XI should be marked. Otherwise the "NO" box should be marked.
10. Attention is drawn to rules 90 and 105 of the Patent Rules 1995. Where there are more than three applicants, see also Note 2 above.
11. Applicants resident in Singapore are reminded that if the Registry of Patents considers that an application contains information the publication of which might be prejudicial to the defence of Singapore or the safety of the public, it may prohibit or restrict its publication or communication. Any person resident in Singapore and wishing to apply for patent protection in other countries must first obtain permission from the Singapore Registry of Patents unless they have already applied for a patent for the same invention in Singapore. In the latest case, no application should be made overseas until at least two months after the application has been filed in Singapore.

For Official Use

Application Filing Date	:	/	/
Request received on	:	/	/
Fee received on	:	/	/
Amount	:	/	/

* Cash/Cheque/Money Order No :

* Delete whichever is inapplicable

09 JAN 2002

STACKED DIE IN DIE BGA PACKAGE

FIELD OF THE INVENTION

This invention generally relates to assembling and packaging multiple semiconductor dies, 5 and more particularly to a stacked multiple die device and methods for fabricating the device.

BACKGROUND OF THE INVENTION

Miniaturization of wireless products such as cellular phones and handheld computers such as personal digital assistants (PDA), has driven the increased demand for smaller component footprints, 10 which in turn increases the popularity of multi-chip stack BGA packaging. Most multi-chip packages involve stacking dies on top of each other by means of adhesive elements. However, to achieve a low package height for multi-chip stacked die packages, a significantly reduced die thickness is needed together with the use of special wire bond techniques to reduce the height of the wire bond loop height.

15 Thin die handling and the required special bonding techniques poses many challenges to the assembly process. FIGS. 1-3 depict conventional ways of packaging a multi-chip stacked die package. As shown in FIG. 1, one prior art package 10 includes two conventional stacked dies, the first (bottom) die 12 being surface mounted by means of an adhesive element 14 to a substrate 16, and a smaller second (top) die 18 being mounted by a second adhesive element 20 onto the active surface 22 of the bottom die 12, each of the dies being wire bonded 24 to the substrate 16. FIG. 2 illustrates a prior art stack die package 10a in which the first (bottom) die 12a is mounted to a substrate 16a in a flip chip attachment, and the second (top) die 18a is surface mounted to the inactive surface of the first die 12a by means of an adhesive element 20a and wire bonded 24a to the substrate 16a. FIG. 3 shows a prior art three-die stack BGA package 10b in which the first bottom die 12b is mounted to a substrate 16b by an adhesive element 14b, a second (middle) die 18b is mounted on the active surface 22b of the bottom die 12b by a second adhesive element 20b, and a third (top) die 28b is mounted on a spacer 30b mounted on the active surface 32b of the second (middle) die 18b, with each of the dies being wire bonded 24b to the substrate 16b.

20 In stacked die assemblies in which the bottom die is a flip chip, there is a limit on the minimum overall thickness of the package that can be achieved. If a solder-bumped wafer having a 150 μm bump height were to be ground to a total thickness of 150 μm to 200 μm , there would be a high occurrence of broken wafers due to the stress induced on the wafers from the bumps. Furthermore, even if the wafer does not crack, the die strength will drop significantly due to the

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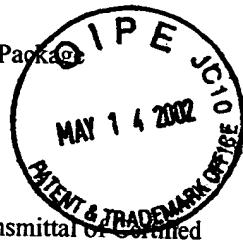
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THE STAMP OF THE U.S. PATENT OFFICE HEREON DENOTES RECEIPT
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In re Application of : Tan, Hock Chuan et al.
Serial No. : 10/068,159
Filing Date : February 5, 2002
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Atty. Docket No. : MTI-31608



Claim for Priority and Transmittal of Certified Copy

Enclosures: Claim for Priority Under 35 USC 119 and Transmittal of Certified Copy; certified copy of priority document and return postcard.

DATE MAILED: 14 MAY 2002
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18W/ KKS

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CDC BY _____

ATTY INITIALS _____